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Temporal variability of Polycyclic Aromatic Hydrocarbons in a receptor site of Puebla -Tlaxcala Valley.

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The Puebla-Tlaxcala Valley is a region with high population scattered over two states, where emissions from combustion of a variety of materials and fuels represent a major problem in the deterioration of air quality. Polycyclic aromatic hydrocarbons (PAHs) are a class of semi-volatile organic compounds that are formed during combustion.

PAH are present in large amounts in the particulate matter comes from the combustion and no combustion. The particle-bound PAHs are formed by accumulation and condensation mechanisms in the particle. In its condensed form are mainly associated with fine particles ($<$ 0.10 um).

The major emission sources of PAHs are open burning, industrial boilers and emission from cars and trucks. Emission rates of PAHs vary significantly depending on vehicle use: fuel type, engine type and catalytic converter, and once emitted into the atmosphere, particulate PAHs may undergo transformation by photo-oxidation.

The measurements were made with a photoelectric aerosol sensor (PAS 2000 CE) and a diffusion charger (DC 2000 CE), the first determines the concentration of PAHs, while the second determines the active surface of particles. The use of these two sensors in parallel is a useful tool to identify quantitatively the greatest source of emission, describe the physical and chemical characteristics of the particles. Correlations between PAHs with the active surface (DC), NO_y and CO, together with an analysis of weather atmospheric transport to approximate the possible origin of these particles. The coefficient PAHs / DC associated with the backward trajectory analysis is a tool to identify potential areas of emission. The correlation between PAHs and NO_x reflects emissions associated with diesel combustion, while the correlation between PAHs and CO, combustion of gasoline.

Concentration patterns were recorded over 24 hours in both PAHs and DC. The average concentration of PAHs was 4.9 ng/m^3 and the maximum of 81.9 ng/m^3 , while the average active surface area was 81.9 mm^2/m^{3}and the maximum of 176.8 mm^2/m^3. Peak concentrations occurred at dawn and in the early hours of the morning then decreasing in the morning and evening. Particularly notable was the drop in the concentration of both PAHs and DC between 8 and 10 am , this period is when the vehicular activity peaks as the use of fuels for heating homes is intense. Additionally, this period is when the boundary layer is fully established favoring the accumulation of newly issued pollutants and remnants of the night. The breaking of the layer precisely between 8 am and 9am resulting in a rapid decrease in the concentrations of all pollutants favored the vertical mixing them with cleaner air masses previously located above the boundary layer. Once broken the boundary layer , the new layer grows and pollutants are mixed with air masses that are being transported to other sites which establishes the dominant concentrations and in the day. By 7 pm there is an increase in vehicular traffic and even dominates the regional wind ventilation, a slight increase was observed in the concentrations of CO , NO_x and DC.